24. An automatic transmission control system for an automobile as defined in Claim 23, wherein said vehicle weight estimation means estimates said vehicle weight by using at least said acceleration during a predetermined time period, commencing when said acceleration has exceeded a predetermined value.--

REMARKS

Applicant acknowledges the objection to the drawing based on the deficiencies cited in PTO Form 948, and respectfully requests that correction be deferred until this application has passed to issue.

With respect to the two claims numbered 21, applicant notes that the claim originally misnumbered in the original application as Claim 21 was renumbered as Claim 17 in the Preliminary Amendment dated December 3, 1992.

Claims 1-22 have been rejected under 35 U.S.C. § 112, second paragraph as indefinite for failing to particularly point out and distinctly claim the invention, based on a number of informalities cited by the Examiner. In response to this ground of rejection, applicant has reviewed all of the claims, and has amended them generally, including amendments which are believed to eliminate each of the informalities referred to by the Examiner. Accordingly, reconsideration and withdrawal of this ground of rejection are respectfully requested.

Claims 1, 8-12 and 15-18 have been rejected under 35 U.S.C. § 102(b) as anticipated by Morita, U.S. Patent No. 5,035,160. In response to this ground of rejection, applicant has substantially rewritten the original Claim 21 and has amended it in a manner which is believed to more clearly highlight the differences which distinguish the present invention from Morita. At the same time, Claim 1 has been retained in its original form, and applicant respectfully submits that it also distinguishes over the Morita reference for reasons set forth hereinafter.

The present invention relates to an automatic automobile transmission having a shifting pattern which can be varied in response to changing operating conditions of the vehicle during operation. In particular various operating parameter are used to estimate the running load of the vehicle and its weight, and the shift pattern is changed based on the results. In this manner, the optimal shift pattern is selected in order to accommodate various driving environments, such as steep inclines, steep downhills, changes in vehicle weight, and the like.

These features are set forth in Claim 1 of the present application, which recites means for estimating the automobile load, output torque estimation means for calculating an output torque based on torque characteristics of the drive train, means for estimating a running load of the vehicle, a memory for storing at least two shift schedules, and a control unit which determines a shift schedule based on the estimated running load and the stored shift schedules.

Claim 23, which is based on the original Claim 1 with clarifying amendments as noted previously, recites more specifically, means for estimating the weight of the automobile and means for receiving an acceleration signal indicative of acceleration of the automobile. Furthermore, Claim 23 also recites that the running load is estimated based on the estimated weight of the automobile, its acceleration, and the estimated output torque, with a shifting schedule for the automatic transmission being selected on the basis of the estimated running load, the estimated weight of the automobile and the stored shift schedules. Finally, in both Claims 1 and 23, means are provided for selecting a gear position of the automatic transmission based on the determined shift schedule. Claim 18 is similar in scope to Claim 23.

The Morita patent discloses an automatic transmission control system which calculates the running resistance of the vehicle based on output signals from an engine rpm sensor, an engine load sensor, and a vehicle speed sensor, and selects a suitable transmission shifting pattern based on the calculated running resistance. The formula for calculation of the running resistance is shown at col. 2, line 18.

The Office Action at paragraph 8.1 indicates that Morita teaches "load computation means for determining the weight of the vehicle", citing col. 4, lines 24+. Applicant respectfully submits, however, that such load computation means for determining the weight of the vehicle are not disclosed in the Morita reference; in fact, Morita makes it clear that preset

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<u>values</u> are used for the vehicle weight, which is not estimated in the manner disclosed and claimed by applicant. That is, at col. 4, line 22 <u>et</u> <u>seq.</u>, Morita states "the radius of the driven wheels r and <u>the weight of the vehicle m are prestored</u> in the ROM 72 and read out therefrom as necessary. <u>The vehicle weight m is</u> <u>generally set to be as the net weight of vehicle plus a</u> <u>prescribed standard weight of the passengers (e.g., the total</u> <u>weight of two average adult persons)</u>."

According to the present invention as recited in Claim 1, means are provided for estimating the automobile load of the vehicle, based on operating parameters of the vehicle. The advantage of this arrangement is that as the vehicle weight changes, the estimated weight also changes, and the transmission control system is thus able to adapt to differing operating circumstances. By contrast, the above quoted portion of the Morita reference makes it clear that the vehicle weight is preset, based on certain assumptions about the weight of the vehicle and the number and weight of its occupants, and cannot be varied. Thus, the foregoing feature of the invention, as recited in Claim 1 is not provided in Morita.

In addition, Claim 23 has been further clarified to recite specifically the provision of weight estimation means and means for receiving an acceleration signal, and to further recite that the running load estimate is based on the estimated weight of the vehicle, its acceleration, and the estimated output torque. Finally, a shift schedule for the automatic transmission is selected based on the estimated running load and the estimated

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vehicle weight. Applicant respectfully submits that none of the foregoing features is taught by Morita et al. Accordingly, applicant respectfully submits that Claims 1, 18 and 23 distinguish over Morita et al. for the reasons set forth above.

Claims 2-4 and 19-20 have been rejected under 35 U.S.C. § 103 as unpatentable over Morita (above) in view of Tanaka, U.S. Patent No. 5,309,790. Initially, it is noted that Claims 2-4 and 19-20 all depend from Claim 23, which is believed to be allowable for the reasons set forth above. Moreover, while the Tanaka reference at col. 5, lines 48 et seq. teaches that it is known to calculate the input torque of the transmission based on the torque characteristics of the torque converter and engine speed, there is no teaching or suggestion in either Tanaka or in Morita of using the information thus calculated in the context of the present invention; specifically, the estimation of a running load of the automobile, and the selection of a shift schedule for the automatic transmission based on the running load and the estimated weight of the automobile.

In addition, applicant notes that Claims 21 and 22 in particular recite a further refinement of the invention in which calculation of the output torque is performed by one of two alternative methods, depending on the ratio between the input and the output speed of the torque converter. This feature is also missing from both Morita and Tanaka.

Claim 13 has been rejected under 35 U.S.C. § 103 as unpatentable over Morita in view of Tanaka, and further in view

of Asayama et al., U.S. Patent No. 4,836,057. As noted in the Office Action at paragraph 11, Asayama et al. teaches calculation of the automobile weight based on driving torque and acceleration, as well as other parameters. However, the method employed by Asayama et al. to estimate vehicle weight differs significantly from that of the present invention.

Claim 13 specifically recites that the vehicle weight is estimated based on the throttle valve opening signal and a vehicle speed signal in addition to the acceleration signal. In paragraph 11 of the Office Action, it is indicated that vehicle acceleration is determined by differentiating the vehicle speed, and therefore, since the vehicle weight is estimated based on vehicle acceleration, it is also based on vehicle speed, as claimed. Applicant notes, however, that the language of Claim 13 recited above clearly recites that the vehicle weight is determined based on the throttle valve opening and vehicle speed in addition to the acceleration vehicle. Applicant respectfully submits that the use of vehicle acceleration as disclosed in Asayama et al. is substantially different than using vehicle speed in addition to vehicle acceleration. Accordingly, Claim 13 is also believed to be allowable.
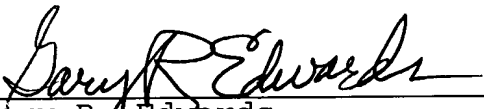
In light of the foregoing amendments and remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would

be appreciated since this should expedite the prosecution of the application for all concerned.

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time sufficient to effect a timely response and shortages in other fees, be charged, or any overpayment in fees be credited, to the Deposit Account of Evenson, McKeown, Edwards & Lenahan, Account No. 05-1323 (Docket # 381TO/41092).

Respectfully submitted,

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